

Serial No. 10/757,391

Atty. Docket No. 249/436

Supplemental Amendment dated April 17, 2007 Supplemental Amendment to RCE filed January 22, 2007AMENDMENTS TO THE CLAIMS

Following is a listing of all claims in the present application, which listing supersedes all previously presented claims:

Listing of Claims:

1. (Currently Amended) A method of ejecting ink comprising:
 - (a) filling a rear end of a nozzle with ink using a capillary force, the rear end of the nozzle being surrounded by a hydrophilic layer;
 - (b) forming an electric field directed toward an outlet of the nozzle on a front end of the nozzle, the front end of the nozzle being surrounded by a hydrophobic layer;
 - (c) modifying a magnitude and location of the electric field to modify a surface property of the hydrophobic layer to hydrophilic and vary a surface tension of the ink to separate at least one ink droplet ~~droplets~~ having a predetermined volume from the ink within the front end of the nozzle and to move the at least one separated ink ~~droplet~~ ~~droplets~~ within the front end of the nozzle toward the outlet of the nozzle; and
 - (d) ejecting the separated ink droplets through the outlet of the nozzle.
2. (Previously Presented) The method as claimed in claim 1, wherein forming an electric field directed toward the outlet of the nozzle comprises:

sequentially applying a voltage to a plurality of electrode pads, the plurality of electrode pads being connected in series and disposed on the front end of the nozzle at predetermined intervals in a lengthwise direction of the nozzle.
3. (Original) The method as claimed in claim 2, wherein varying the surface tension of ink comprises:

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lowering the surface tension of ink adjacent to one of the plurality of electrode pads to which the voltage is applied so that a contact angle of ink with respect to the hydrophobic layer is reduced.

4. (Original) The method as claimed in claim 2, wherein forming the electric field and varying the surface tension of ink comprises:

sequentially applying a voltage to a first electrode pad and a second electrode pad of the plurality of electrode pads to move ink within the front end of the nozzle to a position corresponding to a location of the second electrode pad; and

cutting off the voltage applied to the first electrode pad to separate the ink droplets from ink.

5. (Original) The method as claimed in claim 4, wherein after the separation of the ink droplets from ink, (c) further comprises:

cutting off the voltage applied to the second electrode pad and sequentially applying a voltage to at least one electrode pad of the plurality of electrode pads disposed after the second electrode pad to move the separated ink droplets toward the outlet of the nozzle.

6. (Original) The method as claimed in claim 2, wherein an area of each of the plurality of electrode pads is variable so that a volume of the ink droplets is adjustable.

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7. (Original) The method as claimed in claim 2, wherein a moving speed of the separated ink droplets in the front end of the nozzle is adjusted by a time difference during the sequential application of the voltage to the plurality of electrode pads.

8. (Original) The method as claimed in claim 2, wherein (d) further comprises:
cutting off the voltage applied to an electrode pad where the ink droplets are located,
prior to ejecting the separated ink droplets.

9. (Original) The method as claimed in claim 1, wherein in (d), the ejection of the separated ink droplets is performed by an electrostatic force.

10. (Previously Presented) The method as claimed in claim 1, wherein in (d), the ejection of the separated ink droplets is performed by lowering a pressure of a fluid flow around the outlet of the nozzle.

11-20. Cancelled

21. (Previously Presented) The method as claimed in claim 3, wherein varying the surface tension of ink further comprises disposing an insulating layer in the front end of the nozzle in a lengthwise direction between the electrode pads and the hydrophobic layer.

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22. (Withdrawn) The method as claimed in claim 2, wherein forming the electric field further comprises disposing a non-continuous hydrophobic layer in the front end of the nozzle opposite the electrode pads.

23. (Withdrawn) The method as claimed in claim 22, wherein disposing the non-continuous hydrophobic layer comprises applying a hydrophobic layer having a plurality of pores, holes or probes to the lengthwise direction along an external front end of the nozzle, such that the ink and an electrode disposed opposite the electrode pads, are electrically connected.

24. (New) A method of ejecting ink, comprising:

filling a rear end of a nozzle with ink using a capillary force, the rear end of the nozzle being surrounded by a hydrophilic layer;

forming an electric field directed toward an outlet of the nozzle on a front end of the nozzle surrounded by a hydrophobic layer, the electric field moving at least a portion of the ink within the front end of the nozzle;

changing a surface property of at least one predetermined portion of the hydrophobic layer to hydrophilic and varying a surface tension of the ink to separate at least one ink droplet having a predetermined volume from the ink within the front end of the nozzle and moving the separated ink droplet within the nozzle toward the outlet of the nozzle; and

ejecting the separated ink droplet through the outlet of the nozzle.

25. (New) The method as claimed in claim 24, wherein forming the electric field comprises sequentially applying a voltage to a plurality of electrode pads, the plurality of

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electrode pads being connected in series and disposed on the front end of the nozzle at predetermined intervals in a lengthwise direction of the nozzle.

26. (New) The method as claimed in claim 25, wherein each of the electrode pads corresponds to a respective predetermined portion of the hydrophobic layer and each of the respective predetermined portions of the hydrophobic layer retains hydrophobic properties so long as a voltage is not applied to the respective electrode pad.

27. (New) The method as claimed in claim 26, wherein changing a property of at least one of the predetermined portions comprises applying a voltage to the respective one of the electrode pads corresponding to the at least one predetermined portion.

28. (New) A method of ejecting ink, comprising:

- filling a rear end of a nozzle with ink using a capillary force, the rear end of the nozzle being surrounded by a hydrophilic layer;
- changing a surface property of a first portion of a layer surrounding a front end of the nozzle from hydrophobic to hydrophilic, the first portion including at least a first sub-portion and a second sub-portion;
- changing the surface property of the first sub-portion of the first portion back to hydrophobic to separate an ink droplet having a predetermined volume from the ink, the predetermined volume corresponding to an area of the second sub-portion;

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changing the surface property of a second sub-portion of the first portion back to hydrophobic to move the separated ink droplet to a second portion of the front end of the nozzle, the second portion being closer to an outlet of the nozzle than the first portion; and ejecting the separated ink droplet through the outlet of the nozzle.

29. (New) The method as claimed in claim 28, wherein the second sub-portion is closer to the outlet than the first sub-portion.

30. (New) The method as claimed in claim 1, wherein the separated ink droplet within the front end of the nozzle is spaced apart from the ink within the front end of the nozzle before being moved toward the outlet of the nozzle to be ejected.